AMENDMENTS

Amendments to Specification

Replace the paragraph on page 10 starting with "Many of the functional units described in this specification..." with the following paragraph:

> Many of the functional units described in this specification have been labeled as modules, in order to more particularly emphasize their implementation independence. Modules may be implemented as instructions or logic executable by a processor and stored on a computer readable storage medium. For example, a module may be implemented as a hardware circuit comprising custom VLSI circuits or gate arrays, off-the-shelf semiconductors such as logic chips, transistors, or other discrete components. A module may also be implemented in programmable hardware devices, such as field programmable gate arrays, programmable array logic, programmable logic devices, or the like.

Replace the paragraph on page 2 starting with "In one form of data mirroring, data is written to two or more storage volumes..." with the following paragraph:

> In one form of data mirroring, data is written to two or more storage volumes in parallel. As a result, one or more redundant copies of the data is always available in case one of the volumes fails. In remote data mirroring systems, data is written to the source volume at one location and to the one or more target volumes at remote locations. Often, a transmission link facilitates data transmission between a source storage controller connected to the source volume and target storage controllers connected to the target volumes. ~~Transmission links are typically inefficient, having a much lower transmission rate than the read and write rates of the source storage controller.~~

Replace the paragraph on page 5 starting with "In a first aspect of the present invention..." with the following paragraph:

In a first aspect of the present invention, an apparatus for speculative data mirroring includes a rollback log configured to receive data corresponding to one or more write operations directed to a selected storage region within a source volume. Also included is a mirror control module configured to initiate a synchronous operation on a corresponding storage region within a target volume and to send the data corresponding to the write operations to the target volume without waiting for feedback regarding the lock operation. The synchronous operation may be a lock ~~operation the~~ operation. The mirror control module may also be configured to remove the data corresponding to the write operations in response to successful completion of the write operations on the target, or resend the data corresponding to the write operations in the event of errors. Due to the unique configuration and operation of the elements of the present invention, latencies associated with synchronous mirroring operations, such as lock operations, are substantially eliminated by assuming that such operations will be successful.

Replace the paragraph on page 5 starting with "Synchronous mirroring operations, such as lock operations..." with the following paragraph:

Synchronous mirroring operations, such as lock operations, are assumed to be successfully completed. For example, in conjunction with initiating a lock operation, a lock command may be sent to the target volume. The ~~target~~ source controller may then proceed to lock a region on the source volume and conduct one or more write operations to that region without waiting for feedback regarding the locking operation on the target volume. In the event of a failed operation, the commands and data within the rollback log may be referenced to reattempt the failed operation.

Replace the paragraph on page 10 starting with "Many of the functional units described in this specification..." with the following paragraph:

Many of the functional units described in this specification have been labeled as modules, in order to more particularly emphasize their implementation independence. Modules may be implemented as instructions or logic executable by a processor and stored on a computer readable storage medium. For example, a module may be implemented as a hardware circuit comprising custom VLSI circuits or gate arrays, off-the-shelf semiconductors such as logic chips, transistors, or other discrete components. A module may also be implemented in programmable hardware devices, such as field programmable gate arrays, programmable array logic, programmable logic devices, or the like.

Replace the paragraph on page 11 starting with "The source storage controller 210a..." with the following paragraph:

The source storage controller 210a in one ~~embodiments initiate~~ embodiment initiates a synchronous operation, such as a lock operation, on the target volume 130b and then immediately conducts subsequent operations, such as write operations, without waiting for feedback before sending the write operations regarding the synchronous operation. Not waiting for feedback increases the performance of the speculative data mirroring system 200.

Replace the paragraph on page 14 starting with "Figure 3 is a flow chart diagram illustrating..." with the following paragraph: